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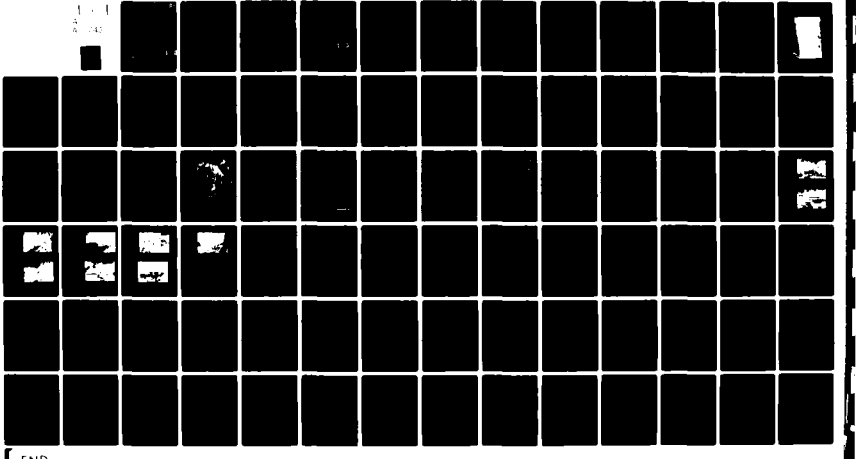

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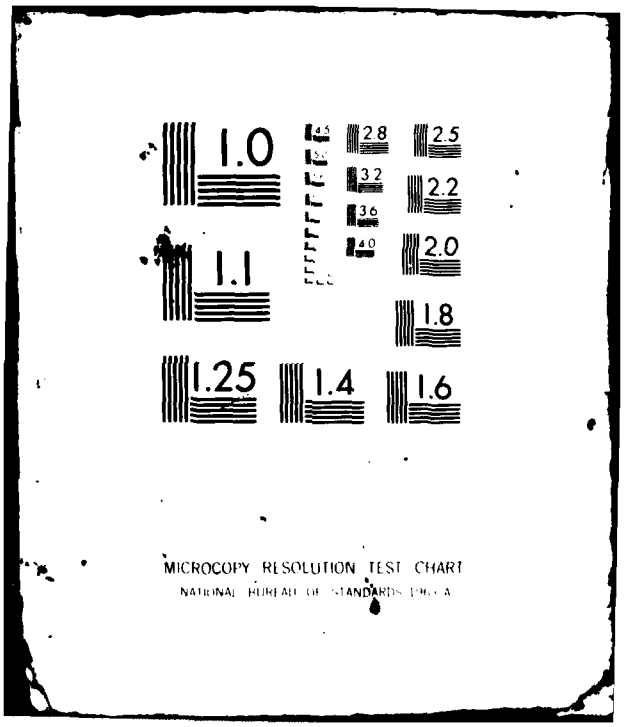
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LOWER HUDSON RIVER BASIN

LAKE LINCOLNDALE DAM

WESTCHESTER COUNTY, NEW YORK
INVENTORY NO. N.Y. 102

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1981

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Westchester County
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and the visual inspection findings of Lake Lincolndale Dam and its appurtenant structures did not reveal conditions which constitute an immediate hazard to human life and property. However, the dam has some

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deficiencies which require further investigations and remedial action.

Using the Corps of Engineers screening criteria for initial review of the adequacy of the spillway, it has been determined that the concrete sill structure is inadequate for all floods in excess of 31 percent of the Probable Maximum Flood (PMF). Overtopping of the dam could cause breaching of the embankment which would significantly increase the hazard to loss of life and property. The spillway is therefore judged to be "seriously inadequate" and the dam is assessed as unsafe.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" overflow section is not mean to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be an inadequacy in the spillway capacity, such that if a severe storm were to occur, overtopping would significantly increase the hazard to life downstream of the dam.

LOWER HUDSON RIVER BASIN

LAKE LINCOLNDALE DAM

WESTCHESTER COUNTY, NEW YORK
INVENTORY NO. N.Y. 102

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C., 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE LINCOLNDALE DAM
I.D. NO. N.Y. 102
D.E.C. NO. 231-1030
LOWER HUDSON RIVER BASIN
WESTCHESTER COUNTY, N.Y.

CONTENTS

APPENDICES

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM	Lake Lincolndale Dam, NY 102
STATE LOCATED	New York
COUNTY LOCATED	Westchester
STREAM	Tributary of Plum Brook
BASIN	Lower Hudson River
DATE OF INSPECTION	17 March 1981

ASSESSMENT

The examination of documents and the visual inspection findings of Lake Lincolndale Dam and its appurtenant structures did not reveal conditions which constitute an immediate hazard to human life and property. However, the dam has some deficiencies which require further investigations and remedial action.

Using the Corps of Engineers screening criteria for initial review of the adequacy of the spillway, it has been determined that the concrete sill structure is inadequate for all floods in excess of 31 percent of the Probable Maximum Flood (PMF). Overtopping of the dam could cause breaching of the embankment which would significantly increase the hazard to loss of life and property. The spillway is therefore judged to be "seriously inadequate" and the dam is assessed as unsafe.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" overflow section is not mean to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be an inadequacy in the spillway capacity, such that if a severe storm were to occur, overtopping would significantly increase the hazard to life downstream of the dam.

It is therefore recommended that within 3 months of notification to the owner, a detailed hydrologic/hydraulic investigation of the structure should be undertaken to determine the

the appropriate mitigating measures that are required. In the interim, a detailed emergency operation plan and warning system should be developed and around-the-clock surveillance should be provided during periods of unusually high precipitation.

In addition, the dam and its appurtenant facilities have other deficiencies, which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within one year. These deficiencies are:

1. The riprap along the upstream slope has been eroded and/or deteriorated and should be replaced. As a result, wave action has caused erosion of this slope.

2. The reinforced concrete along the approximate centerline of the concrete sill apron is badly "broken-up". The apron should be removed and replaced-in-kind, or as a minimum, the broken section replaced.

3. Heavy brush, shrubs, trees and debris should be removed from all locations on the embankment and in the downstream overflow and reservoir drain channels. A program of periodic cutting and mowing should be initiated.

4. The deteriorated surfaces of the concrete training walls of the overflow section should be repaired. Monitor movement of upstream (right side) training wall.

5. The downstream edge of the apron should be protected from future erosion.

6. The dam should be inspected at a time when the reservoir is sufficiently high to determine if seepage occurs through the dam, downstream of the dam, and/or at the abutments.

7. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain and its control facilities. Document this information for future reference. Also develop an emergency action plan.

Eugene O'Brien, P.E.
New York No. 29823

Approved by:

Col. W.M. Smith, Jr.
New York District Engineer

Date: 30 JUN 1981

OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE LINCOLNDALE DAM
I.D. NO. N.Y. 102
D.E.C. NO. 231-1030
LOWER HUDSON RIVER BASIN
WESTCHESTER COUNTY, N.Y.

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers Contract No. DACW 51-81-C-0008 in a letter dated 14 December 1980 in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367 dated 8 August 1972.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing condition of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a. Description of the Dam and Appurtenant Structures

Lake Lincolndale Dam is an earth embankment approximately 580 feet long. The dam has a maximum height of about 22 feet and a crest width of about 6 feet. According to available documents, the embankment is constructed of sandy clay and boulders (See Appendix E). According to the available documents, the embankment has 1V:2.5H (vertical to horizontal) and 1V:2H upstream and downstream slopes, respectively.

A steel sheet pile cutoff wall exists along the centerline of the dam. The top of the wall is approximately one foot below the crest. The depth of piling varies from 10 to 30 feet.

The overflow section of the dam consists of an uncontrolled concrete sill and sloping reinforced concrete apron located near the left abutment contact. The sill is approximately 2 feet in height, 25 feet in length and is keyed into the foundation. The sill and apron structure is bounded at each side by a concrete training wall. A sheet pile cutoff exists along the approximate centerline of the sill.

The discharge channel immediately downstream of the overflow section is approximately 15 feet wide at its mid-height. The channel runs parallel to the toe of the dam (20 feet downstream at its closest point), until it reaches the reservoir drain channel, approximately 100 feet downstream, wherein the combined flow is channeled perpendicular to the dam axis.

A 24-inch diameter reinforced concrete pipe (RCP) serves as a reservoir drain for the project. Discharge through the pipe is controlled by a manually operated center rising screw-type valve which is supported by a concrete platform located at the dam crest. The valve controls a vertical sliding intake gate. The gate stem is housed in a vertical 36-inch diameter concrete access shaft. According to the available documents, trashracks, supported by a concrete structure, are located at the drain inlet.

b. Location

The dam is located in Lincolndale, Westchester County, New York. The dam is approximately 2 miles northwest of Somers, New York and one mile south of the Putnam-Westchester Counties border.

c. Size Classification

The dam has a height of about 22 feet and a reservoir storage capacity of 170 acre-feet. The dam is classified as "small" in size (50 to 1,000 acre-feet).

d. Hazard Classification

The dam is classified as "high" hazard due to the number of homes located 500 ft downstream from the dam.

e. Ownership

The dam is owned and operated by the Lake Lincolndale Property Owner's Association, Lake Lincolndale, Lincolndale, New York, 10540. The Association representative most familiar with the dam and its operations is Mr. Raymond Funk, Locust Drive, Lincolndale, New York, 10540. Telephone No. (914) 258-5506.

f. Purpose

Lake Lincolndale Dam creates a recreational pool for members of the Association.

g. Design and Construction History

The dam was designed by Mr. W. Wickstrom, 17 West 57th Street, New York, New York for the Home Guardian Corporation of the same address. The dam was completed circa 1935; the constructor of the dam is not known.

h. Normal Operating Procedure

Discharge from the lake is through a 24-inch (O.D.) RC reservoir drain. As reported by Mr. Raymond Funk, the drain

is operated when the need arises, particularly during periods of high flow.

1.3 PERTINENT DATA

a.	Drainage Area, Square Miles	0.54
b.	Discharge at Damsite, cfs	
	Maximum Known Flood at Damsite	Unknown
	Reservoir Drain: Maximum Pool (Top of Dam)	Unknown
	Concrete Sill: Maximum Pool	430
c.	Elevation, (MSL), USGS Datum	
	Top of Dam	470 feet
	Maximum Pool	470 feet
	Normal Pool (Concrete Sill Crest)	467 feet
	Top of Sheet Pile Cutoff Wall at Embankment	469 feet
d.	Reservoir	
	Length of Maximum Pool	1400 feet
	Length of Normal Pool	1400 feet
e.	Storage	
	Maximum Pool	275 acre-feet
	Normal Pool	170 acre-feet
f.	Reservoir Surface	
	Maximum Pool	27.6 acres
	Normal Pool	21.6 acres
g.	Embankment Dam	
	Type	Earthfill
	Length	580 feet
	Structural Height	22 feet
	Crest Width	6 feet
	Side Slopes: Upstream (V:H)	1:2.5
	Downstream (V:H)	1:2
	Cutoff	Steel Sheet Pile
h.	Reservoir Drain	
	Type	RCP
	Diameter	24-Inch O.D.
	Closure	Vertical Gate
	Method of Closure	Center Rising Screw-Type Valve

i. Overflow Section

Type	Concrete Sill and Apron
Height of Sill	2 feet
Location	Near Left Abutment Contact
Cutoff	Sheet Pile
Training Walls	Concrete

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Lake Lincolndale Dam is located in the New England Upland Section of the New England Maritime Physiographic Province[4]. The bedrock in this Section consists of metamorphic, igneous and sedimentary rocks which have undergone a complex sequence of position, folding, faulting and erosion. In the vicinity of the damsite, the rock is gneiss and schist of Precambrian Age[5]. The local relief is that of a maturely dissected peneplain modified by continental glaciation.

2.2 SUBSURFACE INVESTIGATIONS

The only subsurface information which exists at the immediate damsite is a longitudinal ground surface profile. This profile is shown on Plate 3 in Appendix A.

The soil deposits in the vicinity of the damsite are primarily glacial tills deposited during the Late Pleistocene Age. The till is composed primarily of gravels, sands and silts.

2.3 DESIGN RECORDS

The construction drawings which exist for the project are shown in Appendix A.

2.4 CONSTRUCTION RECORDS

Specifications for the construction of the dam and the appurtenant structures are available. A field inspection report issued by the State of New York, Division of Engineering during construction is also available. This documentation is presented in Appendix E.

2.5 OPERATION RECORDS

No operation records exist for the project.

2.6 EVALUATION OF DATA

The plans and documentation were obtained from the Corps of Engineers, New York District and the New York State Department of Environmental Conservation. This information is considered adequate for a Phase I investigation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Lake Lincolndale Dam was made on 17 March 1981. The weather was clear and sunny and the temperature was 50-55°F. At the time of this inspection, the reservoir level was approximately 10 feet below the top of the embankment dam, due to dredging operations in the northern reservoir area.

b. Dam

The overall condition of the embankment dam is fair. The crest of the dam contains small bramble bushes to trees up to approximately 18 inches in diameter (See PHOTOGRAPH 4). A 6 foot high (approximate) fence exists along the length of the dam. The crest is slightly depressed along the upstream edge, which is probably due to the effect of erosion, as previously described, and pedestrian traffic. The horizontal alignment appears good.

The upstream slope was measured to be approximately 1V:3 to 3.5H. The measured slope is slightly flatter than the 1H:2.5H shown on the drawings. No old or recent movements were observed along the exposed slope. The riprap which existed along the upper 15 feet of the slope has deteriorated and/or eroded (See PHOTOGRAPH 1). As a result, wave action has caused erosion of the slope, particularly along the crest edge (See PHOTOGRAPH 2).

The downstream slope of the dam contains debris and vegetation consisting of thick brush to large diameter (24±-inch, maximum) trees (See PHOTOGRAPH 4). The slope was measured as 1 to 1.5H:1V, which is steeper than the typical slope shown on the drawing (See Plate 4). Due to the thick vegetation existing on the slope, erosional features and/or embankment sloughing could not be observed.

A section of the sheet pile cutoff wall is exposed near the left abutment. The steel appears rusted but in good condition (See PHOTOGRAPH 5).

It is noted that the seepage condition through the dam could not be adequately determined since the reservoir level was lowered for the dredging operations being performed in the northern reservoir area.

There is no emergency action plan for the project.

c. Overflow Section

The exposed upstream and downstream surfaces of the concrete sill structure are in good condition (See PHOTOGRAPH 6). According to Mr. Funk, depth of discharge over the structure has never exceeded a few inches.

The condition of the downstream reinforced concrete apron is poor. Along the center of the apron (transverse direction), the concrete is completely "broken-up" (See PHOTOGRAPH 6). It is uncertain as to the cause of this condition; however, it may be related to the installation of a gate valve at the downstream base of the concrete sill. According to Mr. Funk, this valve has not been operational for the past 20 years, and its location is not shown on the original drawings. No outlet drain was observed.

The left and right concrete training walls are in poor condition. Some deterioration of the right wall exists (See PHOTOGRAPH 7), as well as along the base of both walls. The upstream monolith of the right wall has rotated approximately 3 inches as measured from the top of the wall, toward the sill channel.

d. Appurtenant Structures - Reservoir Drain

The center rising screw-type valve was operated during this inspection to determine its operability and the hydraulic capability of the reservoir drain. The lifting of the gate and discharge through the drain appeared normal. The exposed stem is protected by a padlocked metal box. The cinder block masonry forming the platform which supports the gate stem at the crest is in fair condition (See PHOTOGRAPH 8).

The vertical 36-inch diameter vertical concrete access shaft which houses the gate stem appeared to be in good condition. No cracks or leaks were observed in the concrete. The ladder, which allows access to the drain pipe and gate, appears to be in good condition.

The exposed downstream portion of the reservoir drain appears to be in good condition.

e. Downstream Channel

The downstream channel overflow section connects with the reservoir drain channel approximately 100 feet downstream of the dam. The channel contains some boulders at its bottom, small bushes, debris and tree up to 18 inches in diameter (See PHOTOGRAPH 9). At its closest point, the channel is approximately 20 feet from the downstream toe of the dam.

Discharge over the apron drops approximately 3 feet at its downstream edge into the earth channel. Under high flows,

erosion of the channel can occur and may eventually cause undermining of the concrete sill structure.

f. Reservoir

Lake Lincolndale is bordered by Lovell Street and Lake Shore Drive. A clubhouse and beach facility exist at the north end of the lake. The surrounding lake area is well-developed.

At the time of this inspection, reservoir dredging operations were being performed at the north end of the lake. According to Mr. Funk, siltation of the reservoir has always been a serious problem. Stone filter beds were constructed at discharge points of roadway culverts to help prevent reservoir siltation problems in the future (See Plate 6).

g. Abutments

No seepage was observed emerging from either abutments; however, the reservoir level was lower than usual due to the current dredging operations.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection did not reveal serious problems which would adversely affect the adequacy of the dam and its appurtenant facilities. The following summarizes the encountered problem areas, in order of importance, with the recommended remedial action:

1. Provide protective riprap along the upstream slope to prevent future erosion.

2. Remove and replace-in-kind the sloping downstream reinforced concrete apron.

3. Heavy brush, shrubs, trees and debris must be removed from all locations on the embankment and from the concrete sill and reservoir drain channels. A program of periodic cutting and mowing should be performed. Inspections should be performed to determine of the removal and/or cutting of vegetation have adversely affected the dam.

4. Repair deteriorated concrete training walls. Monitor and record movement of upstream training wall.

5. Prevent future erosion of downstream channel at edge of spillway apron.

6. Inspect the dam at a time when the reservoir level is sufficiently high to determine if seepage occurs through the dam, downstream of the dam, and/or at the abutments.

7. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain at its control facilities. Document this information for future reference. Develop an emergency action plan.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. It is reported that the reservoir drain is operated when the need arises.

4.2 MAINTENANCE OF DAM

It is reported that the embankment is not maintained on a regular basis. According to Mr. Funk, the reservoir drain valve and stem are maintained regularly. No formal maintenance program or manual exists for the project.

4.3 WARNING SYSTEM IN EFFECT

No warning system is either in effect or preparation.

4.4 EVALUATION

The dam and appurtenances have not been adequately maintained, as evidenced by the items reported in "SECTION 3 - VISUAL INSPECTION".

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Lake Lincolndale Dam is located on an unnamed tributary of Plum Brook about 1-1/4 miles north of the town of Lincolndate, Somers Township, Westchester County (Hydrologic Unit Code No. 02030101). The drainage basin extends north into Putnam County and is roughly triangular in shape with an area of 0.54 square miles. The basin, which consists of a north/south oriented valley with fairly steep side slopes, has relatively little storage. Approximatley 60 percent of the basin has been urbanized with the remaining 40 percent being wooded slopes.

5.2 ANALYSIS CRITERIA

The analysis of the adequacy of the spillway was performed by developing a design flood, using the unit hydrograph method and the Probable Maximum Precipitation (PMF). The all season, 200 square mile 24 hour PMF for the Lincolndale area, taken from Weather Bureau sources, is 22 inches. The unit hydrographs were computed by the Snyder method using coefficients of 2 and 0.5 for C_T and C_p, respectively. The inflow hydrograph was developed by the U.S. Army Corps of Engineers HEC-1DB computer program[1]. Loss rates of 2.0 inches initial and 0.1 inch/hour constant were estimated as representative of the basin for the design storm.

In accordance with the Recommended Guidelines for Safety Inspection of Dams[3], the adequacy of the spillway was analyzed using the Probable Maximum Flood (PMF). A multi-plan analysis was performed for the full, 0.75, 0.50 and 0.25 PMF.

5.3 SPILLWAY CAPACITY

The ungated concrete sill with a crest elevation of 467 feet (MSL) is 25.0 feet in length with vertical wingwalls 3.0 feet high. The computed maximum discharge with the water surface at El 470 (top of dam) is 430 cfs.

5.4 RESERVOIR CAPACITY

The normal reservoir capacity is listed as 170 acre-feet. The computed surcharge storage of 105 acre-feet is equivalent to approximately 3.7 inches of runoff over the entire basin.

5.5 FLOODS OF RECORD

There are no available records of floods or maximum lake elevation.

5.6 OVERTOPPING POTENTIAL

The potential of the dam being overtopped was investigated on the basis of the spillway discharge capacity and the available surcharge storage to meet the selected design flood inflows.

The analysis was performed assuming that the water surface in the reservoir was at concrete sill crest elevation at the start of the flood event. The computed PMF peak discharge was 1,594 cfs. The HEC-1DB analysis indicated that the spillway is only capable of passing 31 percent of the PMF without overtopping the dam. The following is a summary of the computer analysis.

RATIO OF PMF	PEAK INFLOW cfs	PEAK OUTFLOW cfs	OVERTOPPING IN FEET
1.0	1406	1393	0.58
0.75	1055	1177	0.49
0.50	703	582	0.15
0.25	352	222	0.00

5.7 EVALUATION

The dam does not have sufficient spillway capacity to pass either the PMF or one-half (1/2) PMF without overtopping and the dam and appurtenances are assessed as being "seriously inadequate".

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not reveal conditions which would adversely affect the structural stability of the dam. The dam and appurtenances do have some deficiencies, which if left uncorrected, could potentially affect the stability of the dam. These deficiencies are as follows:

1. Erosion of the upstream slope, particularly along the crest edge, has occurred due to the lack of slope protection.

2. The downstream concrete apron is badly "broken-up". Discharge over the concrete sill can enter below the intact apron sections and possibly cause additional damage and/or uplifting of the structure.

b. Design and Construction Data

There exists no design or construction data, except for the documentation previously described in Section 2.

c. Operating Records

No operating records are kept for the project.

d. Post-Construction Changes

Aside from current improvement programs being performed in the reservoir area (See Plate 5), no other post-construction changes have been reported.

e. Seismic Stability

In accordance with recommended Phase I guidelines, the dam is located in Seismic Risk Zone 1. However, based on past local seismic experience, the New York State Geological Survey recommends that the damsite is to be considered in Zone 2. In accordance with the guidelines, no seismic analyses are warranted for an earth structure.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and the visual inspection of Lake Lincolndale Dam did not reveal any conditions which constitute an immediate hazard to life or property. However, the deficiencies as outlined in Section 3.2 and below may constitute a serious hazard downstream if left uncorrected.

Using the Corps of Engineers screening criteria for examination of the adequacy of the spillway, it has been determined the spillway can pass 31 percent of the PMF without causing overtopping of the embankment dam. This overtopping could cause breaching of the dam and the resulting flood wave would significantly increase the hazard to downstream residents. For this reason, the dam is assessed as unsafe, non-emergency.

b. Adequacy of Information

This report is based on visual inspection findings, interview data, contract drawings and office hydrological/hydraulic studies. This information is adequate for a Phase I inspection.

c. Need for Additional Investigations

Since the spillway is considered as "seriously inadequate", an additional hydrologic/hydraulic investigation is required to more accurately determine the site specific characteristics of the Lake Lincolndale watershed. Subsequent to this investigation, remedial measures must be initiated to provide sufficient outflow capacity during the one-half (1/2) PMF, such that the embankment is not overtopped during this event.

d. Urgency

The additional hydrologic/hydraulic investigations which are required must be initiated within 3 months from the date of notification. Within one year of notification, remedial measures as a result of this investigation must be initiated, with completion of these measures during the following year. In the interim, develop an emergency action plan for notification of downstream residents and proper governmental authorities in the event of overtopping and provide around-the-clock surveillance of the dam during periods of extreme runoff. The other deficiencies, as reported below, must be corrected within one year of notification.

7.2 RECOMMENDED MEASURES

1. The results of the spillway investigations will determine the appropriate remedial measures required.

2. Provide protective riprap along the top 15 feet of the upstream slope to prevent future erosion by wave action.

3. Remove and replace-in-kind the sloping downstream reinforced concrete apron.

4. Remove all debris and vegetation from the embankment crest downstream slope and downstream channels. Provide a program of periodic cutting and mowing of the embankment surfaces. Inspect the surfaces regularly to determine if removal of vegetation has adversely affected the dam.

5. Repair deteriorated concrete training wall. Monitor and record continually movement of the upstream (right side) wall.

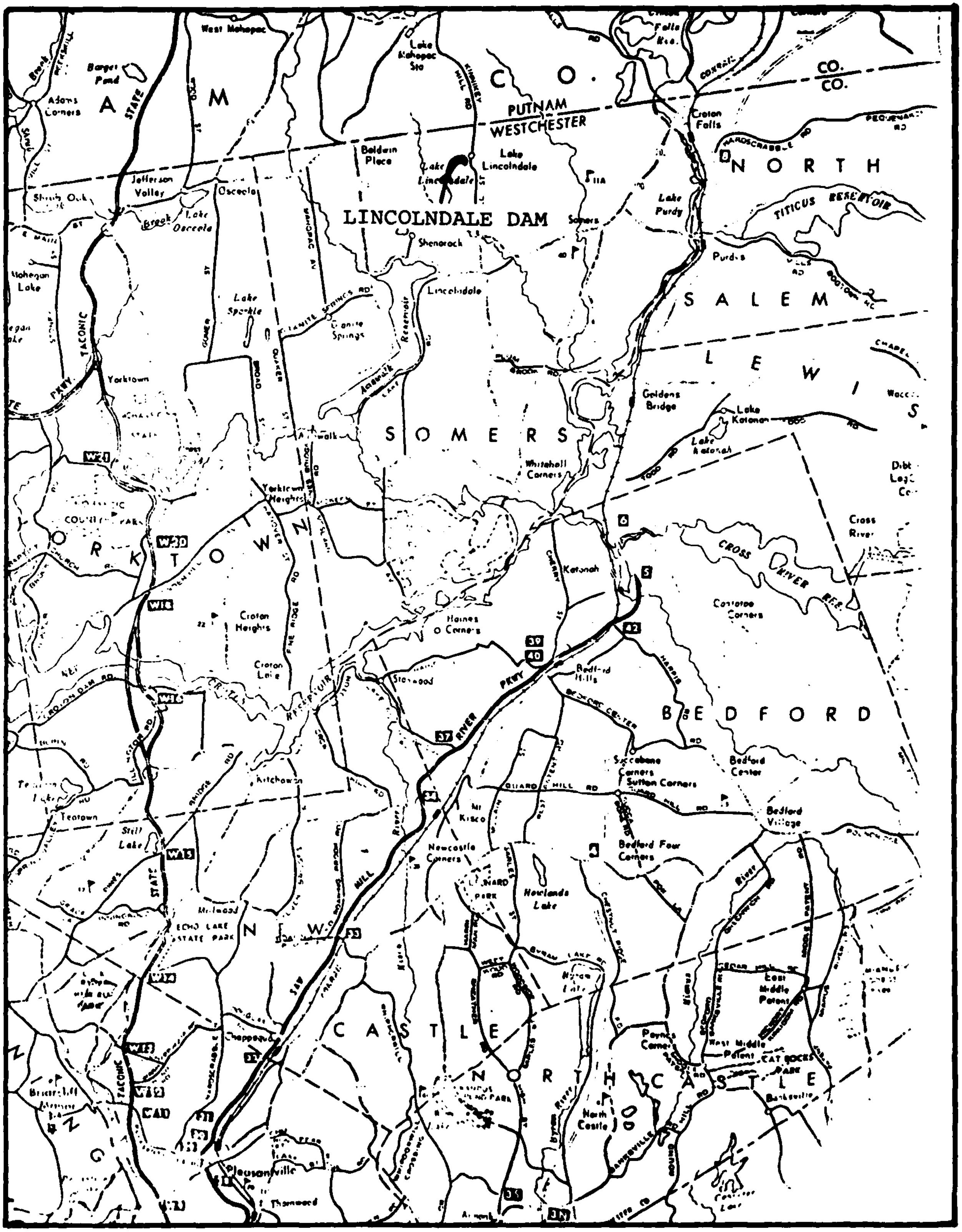
6. Place riprap along downstream edge of apron.

7. Inspect the dam at a time when the reservoir level is sufficiently high to determine if seepage occurs through the dam, downstream of the dam, and/or at the abutments.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain and its control facilities. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.

DRAWINGS

APPENDIX A



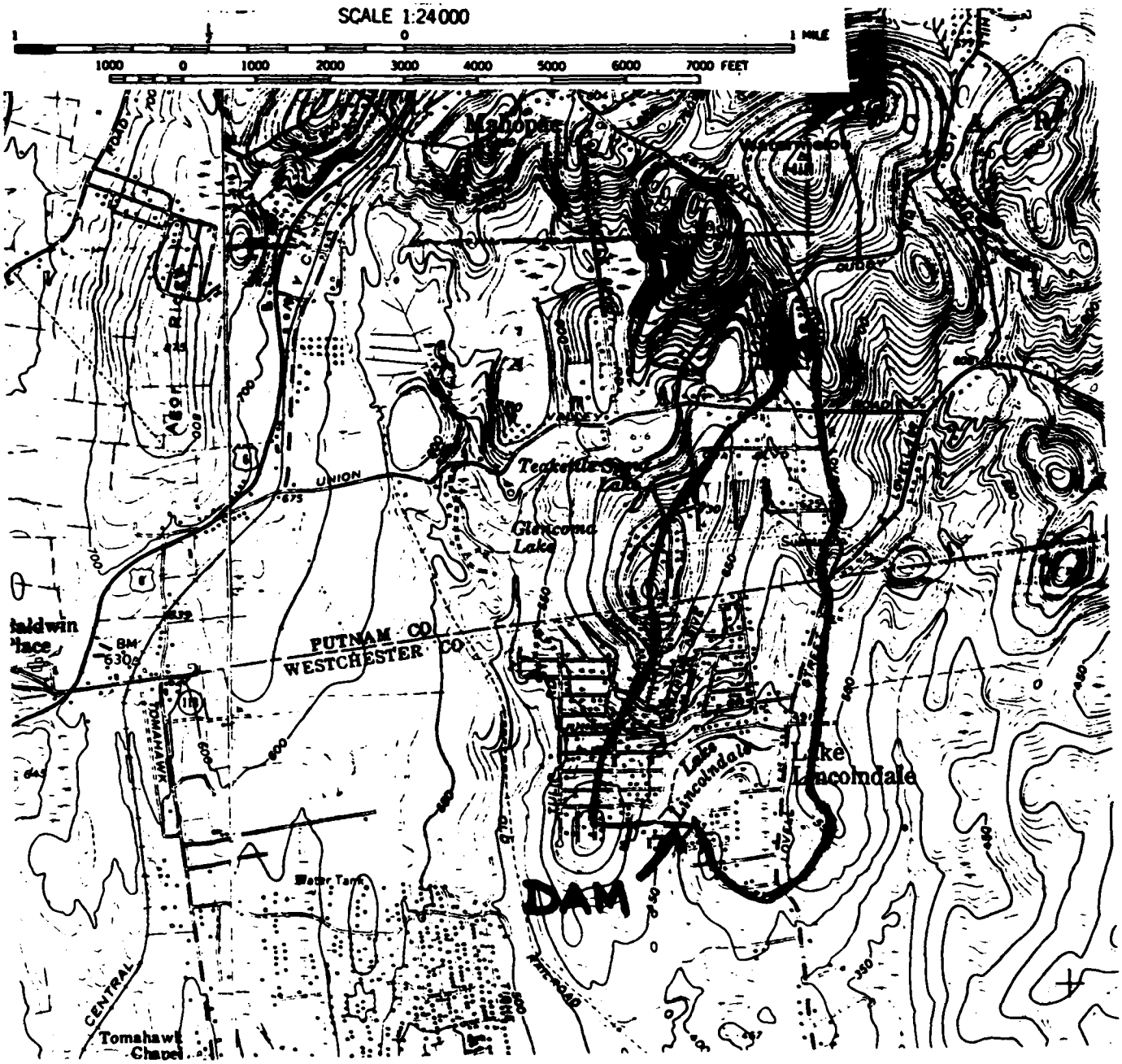
SCALE

4 Miles

4Km

LOCATION MAP
Lincolndale Dam
PLATE 1

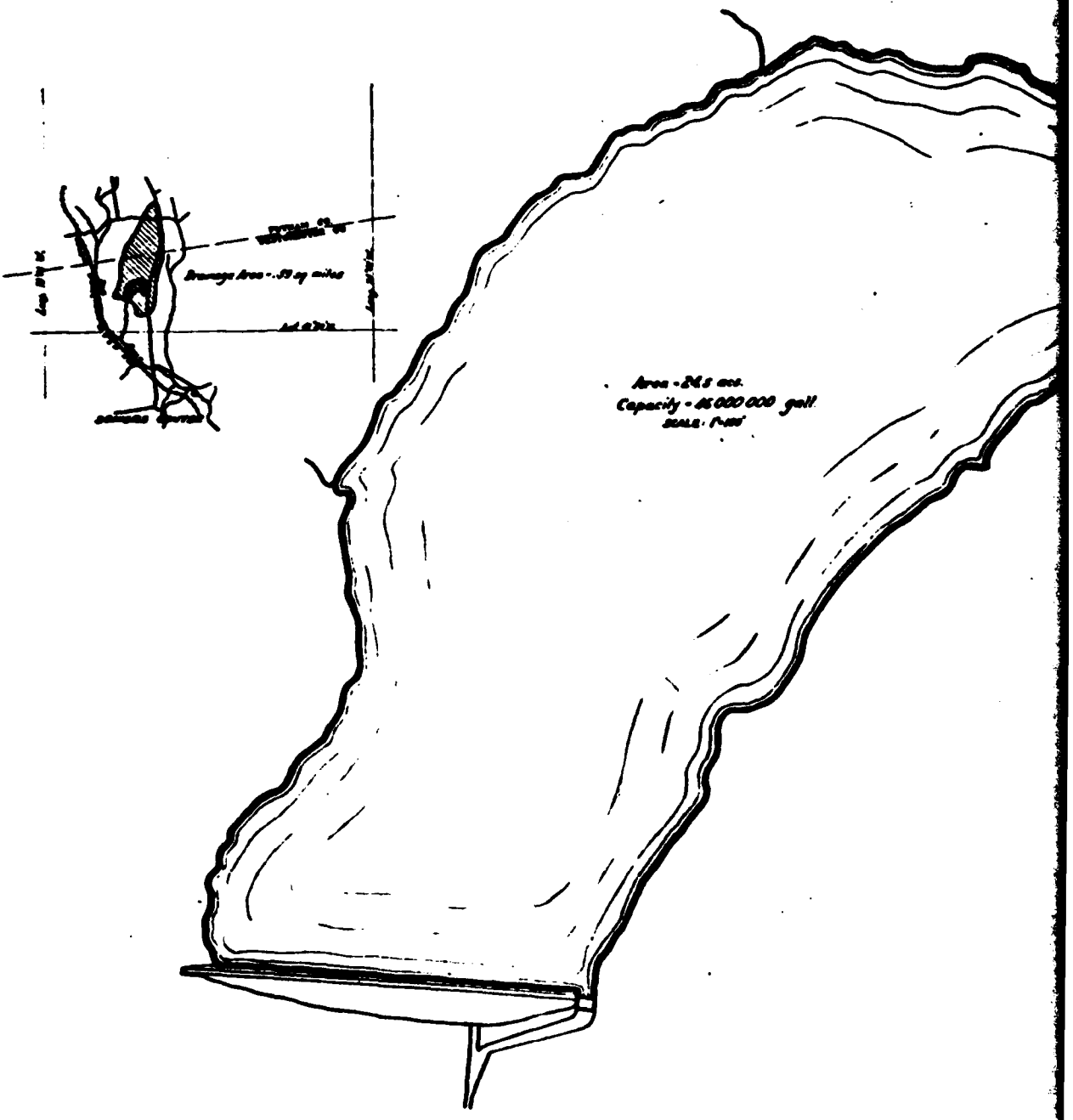
CROTON FALLS, N.Y.

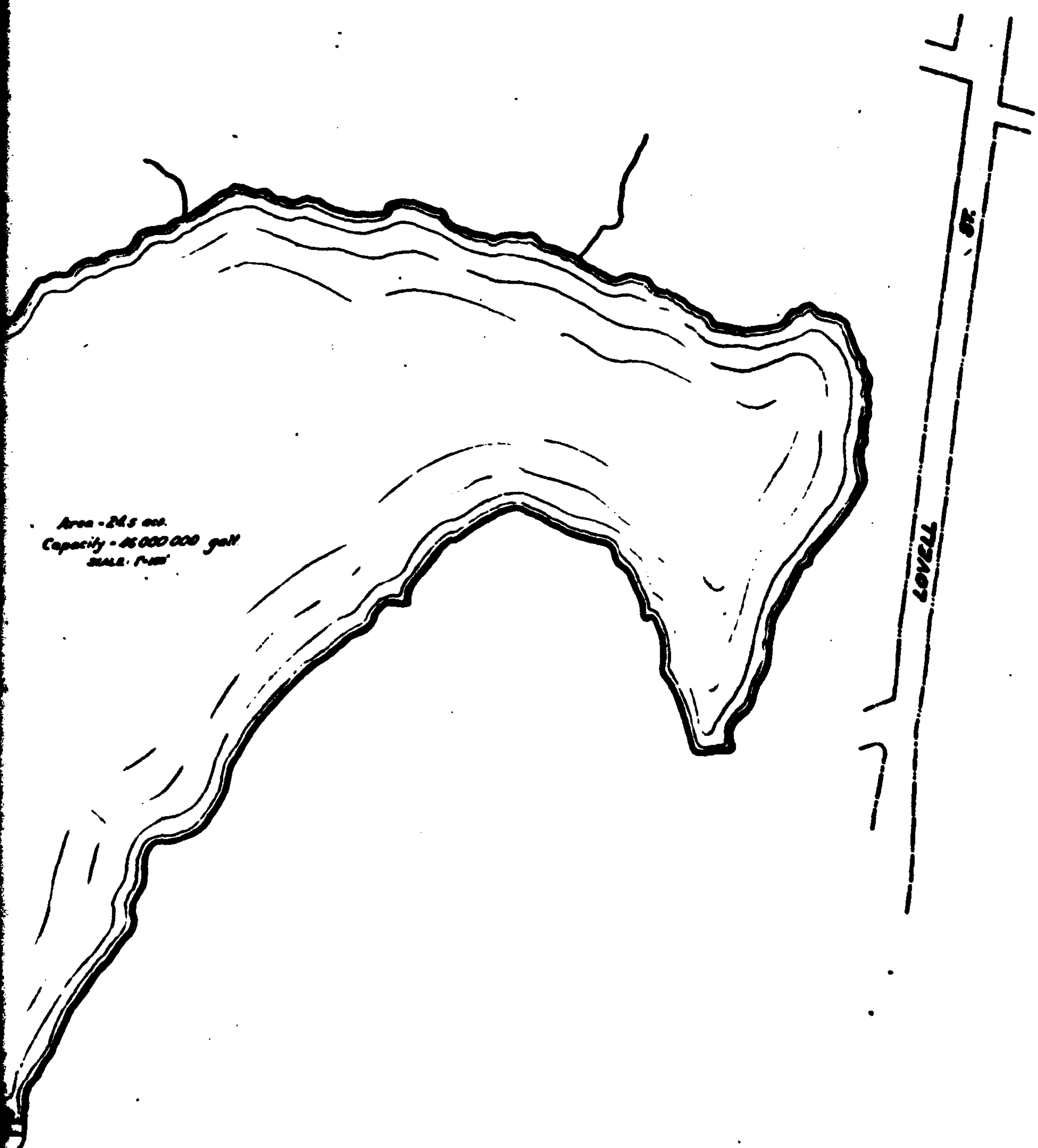


TOPOGRAPHIC MAP

LAKE LINCOLNDALE DAM

PLATE 2


Area - 24.5 acs.
Capacity - 45 000 000 gall.



PLAN OF

PROPOSED DAM

ACROSS

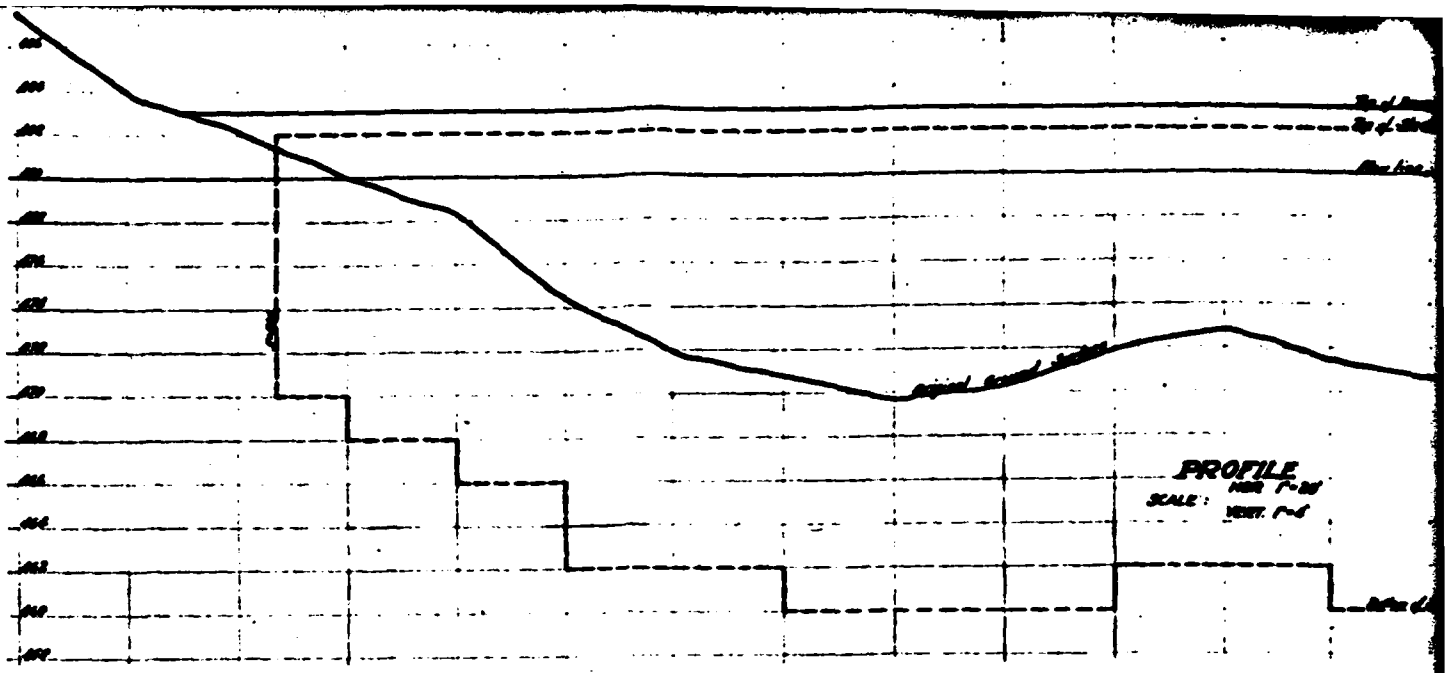
BRANCH OF PLUM BROOK

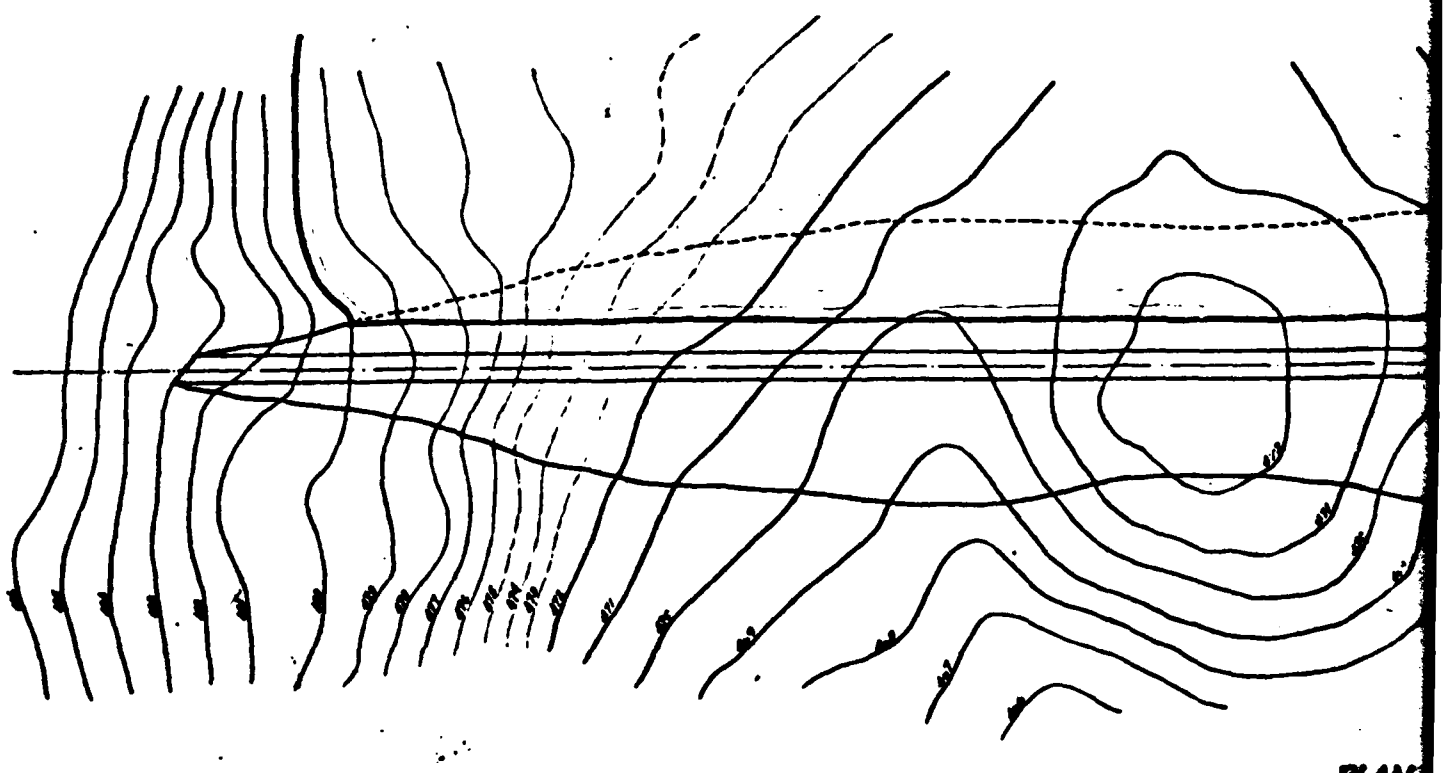
WESTCHESTER CO. N.Y.

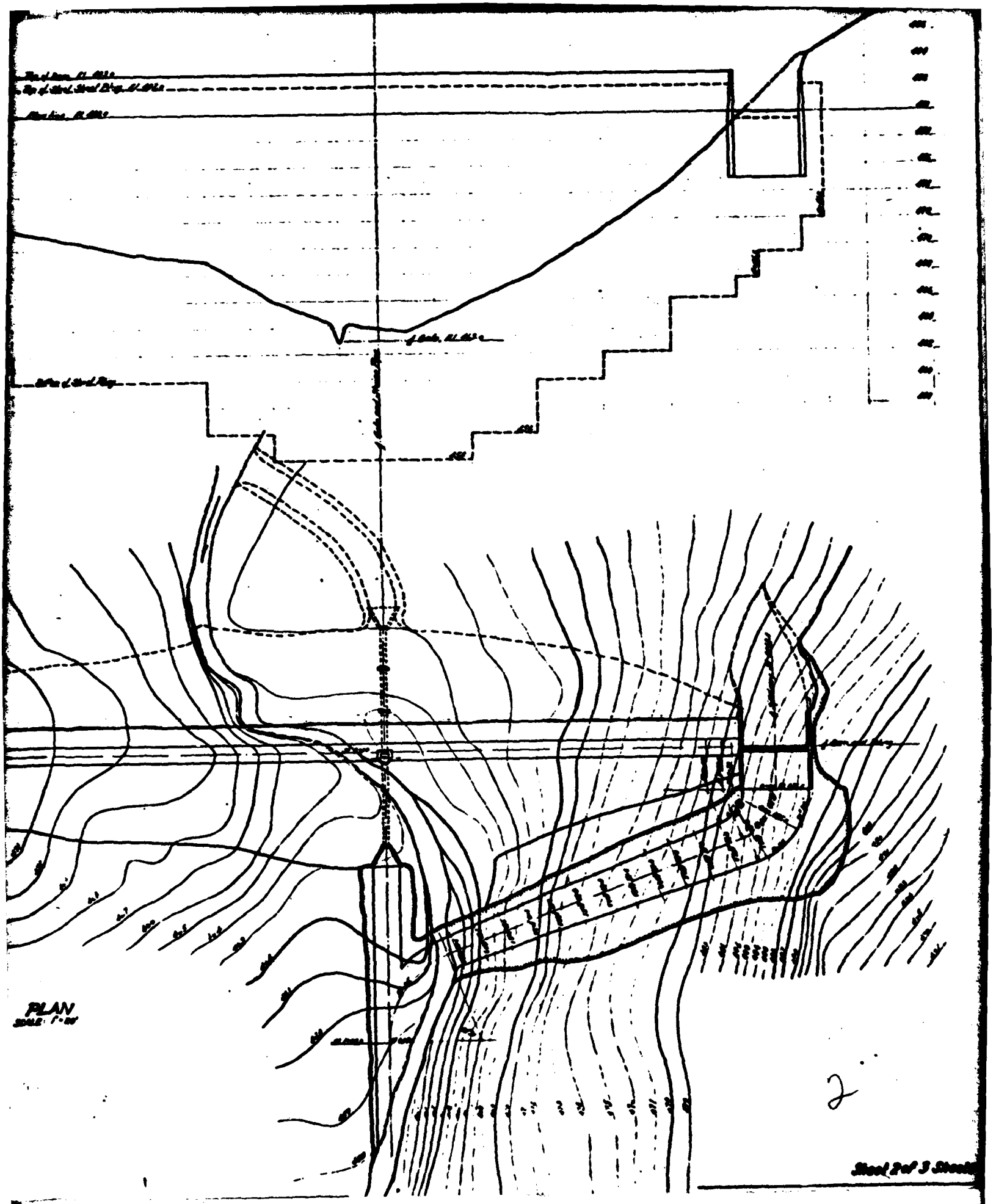
Prepared for … C.E.

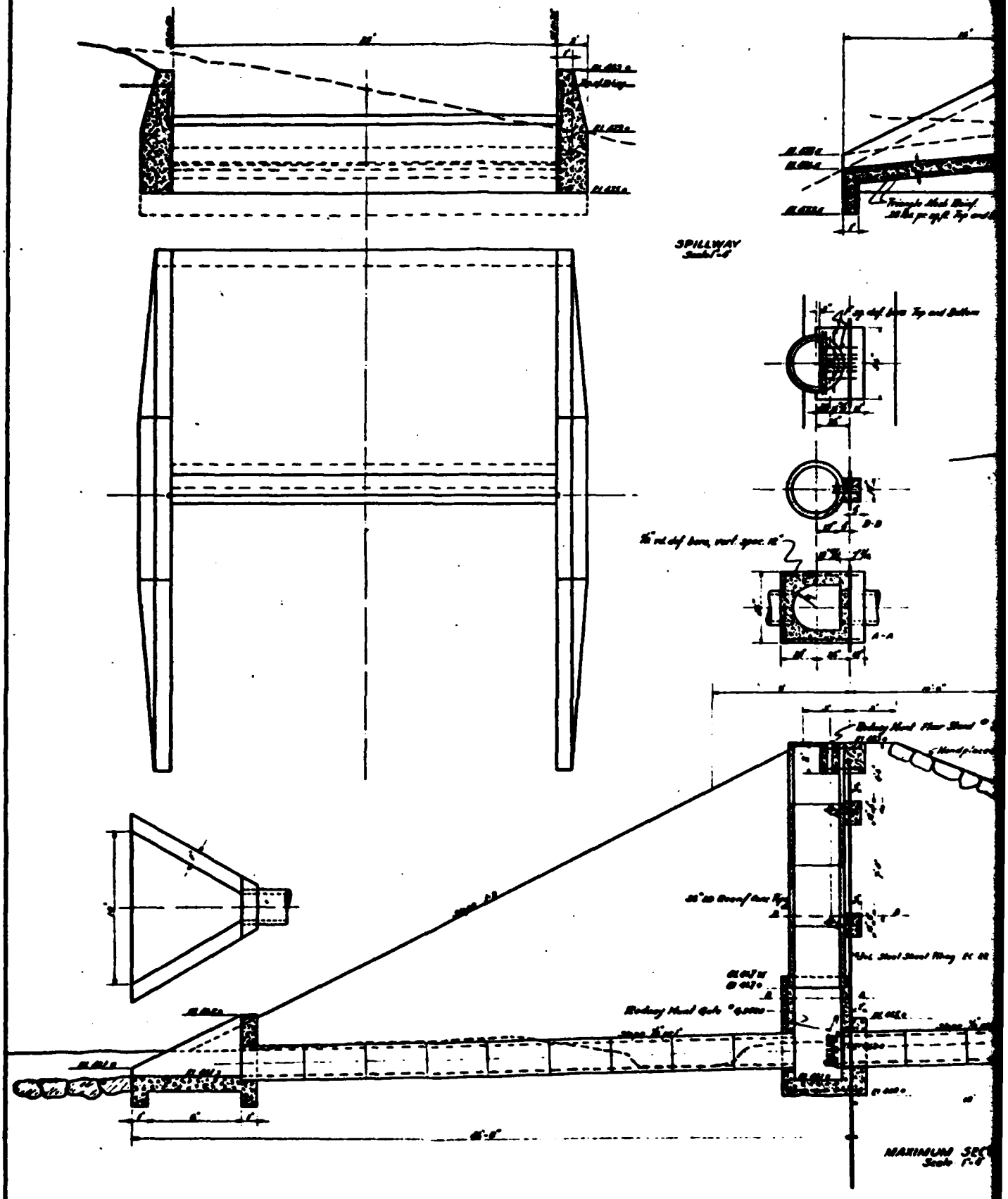
2

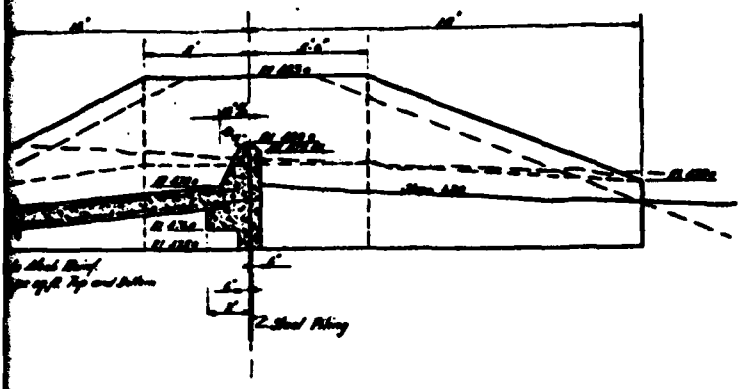
Sheet 1 of 3 Sheets

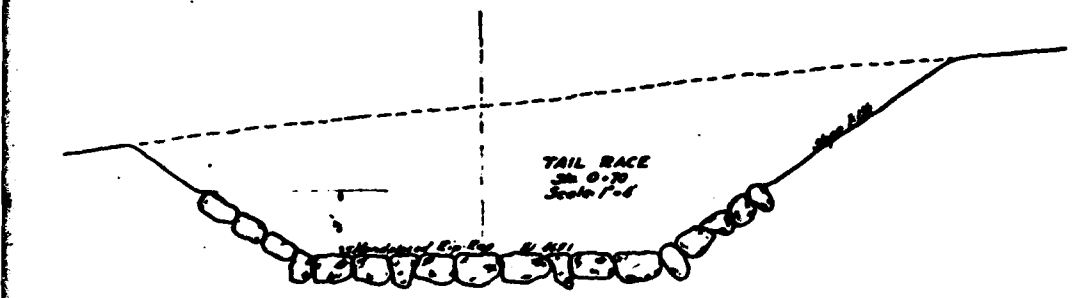

PROFILE

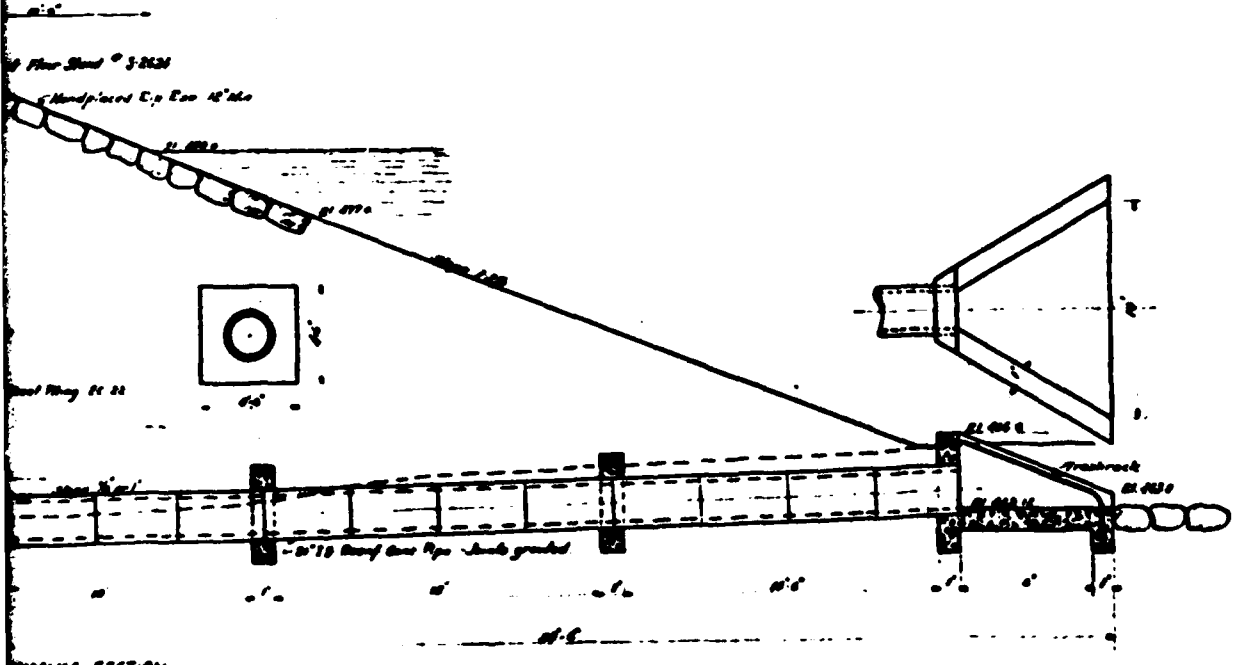

PLAN


PLAN
2
Sheet 2 of 3 Sheets

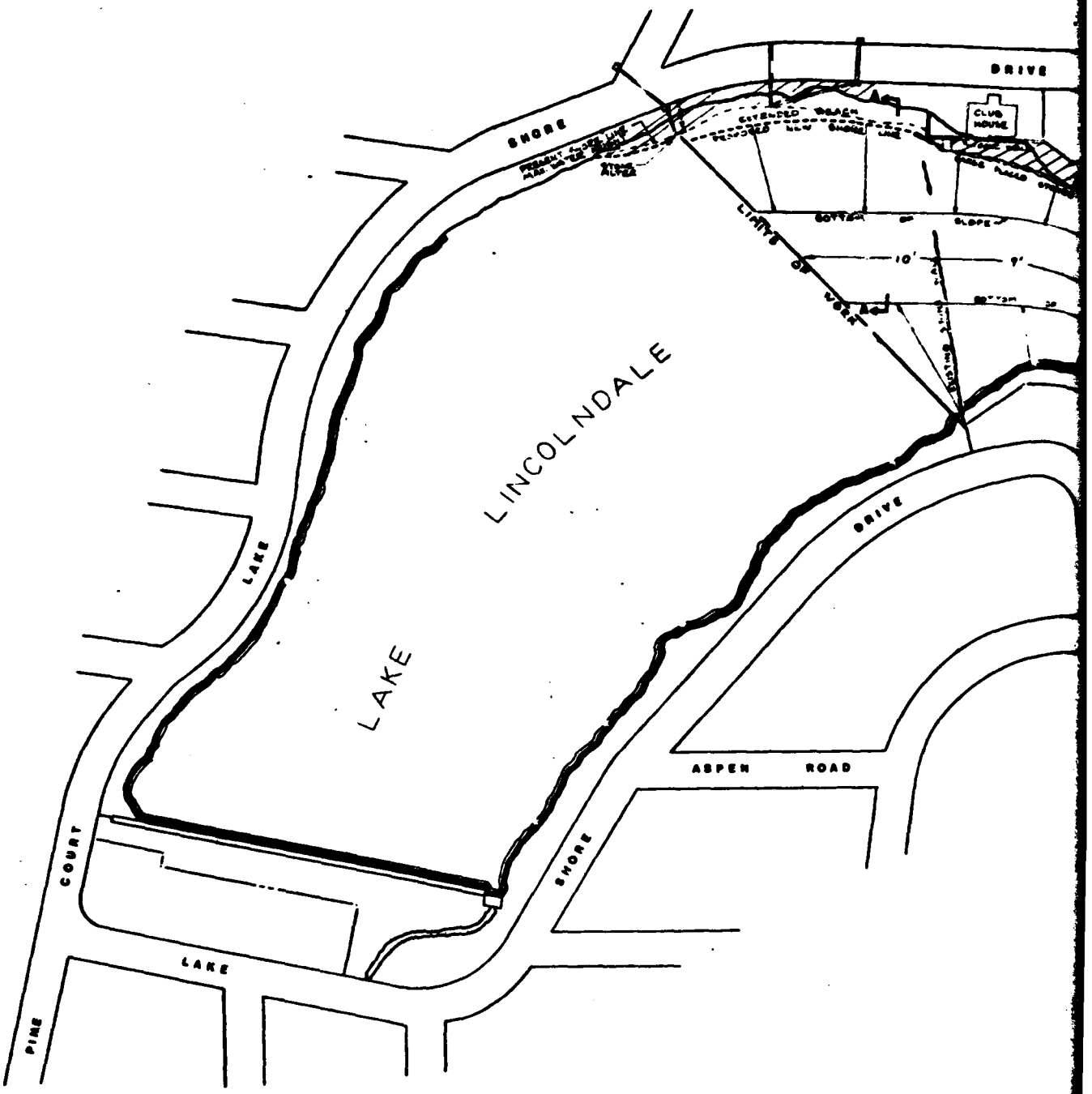

SPILLWAY
Scale 1"=8'
MAXIMUM SEC
Scale 1"=8'

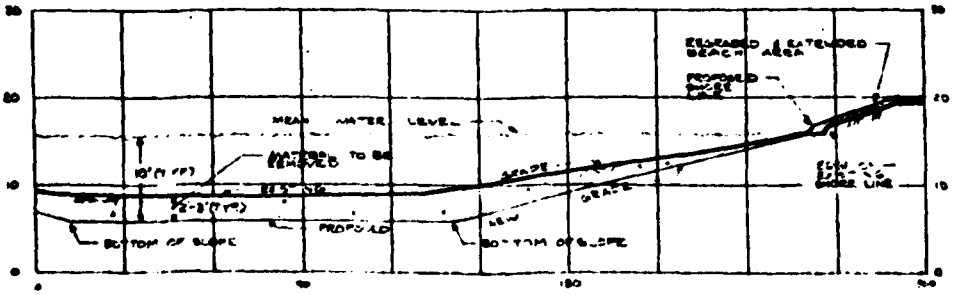




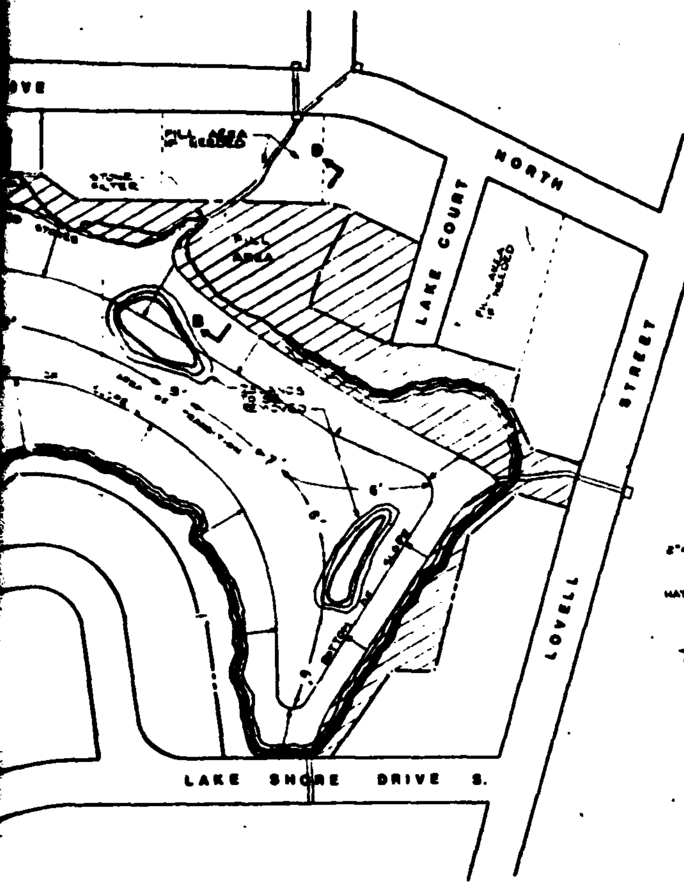


2


DRIVE
SHORE
CLUB HOUSE
LIMITS OF WORK
LAKE
LINCOLNDALE
LAKE
DRIVE
ASPEN ROAD
COURT
SHORE
LAKE
PINE

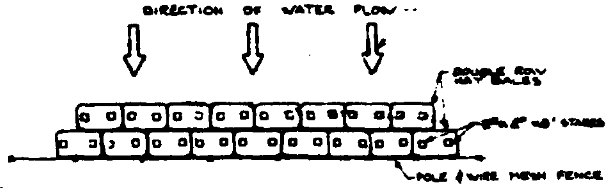

MEAN WATER LEVEL
BOTTOM OF SLOPE

SECTION 'A-A'

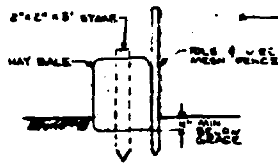


SITE PLAN
(SCALE 1"=100')

STONE FILTER DETAIL



HAY BALE CHECK DAM
PLAN VIEW DETAIL



STAKED HAY BALE
PROFILE DETAIL

EROSION CONTROL DETAILS
(NOT TO SCALE)

GENERAL NOTES

1. REFER TO SPECIFICATIONS REPORT PREPARED BY OLEY-PAVIA INC. MAY 1980.

2. ALL BOTTOM SEDIMENT FROM WITHIN THE SECTION IDENTIFIED AS PHASE I SHALL BE REMOVED BY A METHOD APPROVED BY THE ASSOCIATION.

3. AN EARTHEN DIKE SHALL BE ESTABLISHED BETWEEN THE LAKE AND FILL AREAS AS PER THE DETAIL.

4. ALL DREDGED MATERIAL SHALL BE STOCKPILED AND SPREAD WITHIN THE DESIGNATED FILL AREAS. EXCESS MATERIAL SHALL BE SMOOTH GRADED TO BLEND WITH EXISTING AND SURROUNDING TERRAIN.

5. FINAL GRADING SHALL BE APPROVED BY THE ASSOCIATION OR ITS AGENT.

6. ALL DISTURBED AND EXPOSED SOIL AREAS SHALL BE PROMPTLY LIMED AND SEEDED AFTER FINAL GRADING.

7. MAXIMUM DREDGED DEPTH SHALL NOT EXCEED 10 FT BELOW MEAN LAKE WATER LEVEL.

8. THE DESIGNED GRADE SHALL NOT EXCEED A 3 HORIZONTAL TO 1 VERTICLE SLOPE.

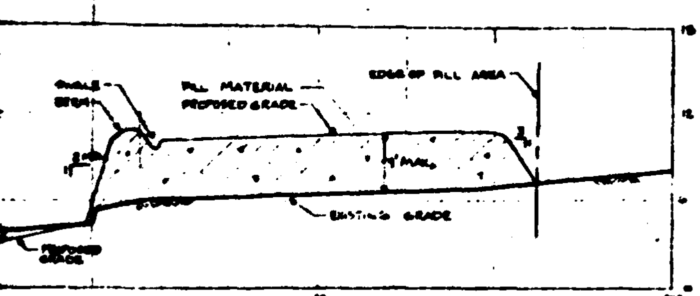
9. AMOUNT OF MATERAL TO BE DREDGED IS APPROX. 25,000 CUBIC YARDS.

10. THE ASSOCIATION, PRIOR TO PROJECT, SHALL MARK OR OTHERWISE IDENTIFY FOR THE CONTRACTOR THE DREDGE AND DISPOSAL AREAS.

11. SEE DETAIL ON STONE FILTERS.

12. SEE DETAIL ON EARTHEN BERM.

13. BERM SHALL BE CONSTRUCTED OF CLEAN FROM MATERIAL FREE OF ORGANICS, BOULDERS, AND DEBRIS AND CAPABLE OF SUPPORTING VEGETATIVE COVER.



SECTION 'B-B'

RESTORATION & RECREATIONAL IMPROVEMENTS OF LINCOLNDALE LAKE		
1"= 100 FT	MAP	RML
6/6/80		
PREPARED FOR: LINCOLNDALE LAKE ASSOC. SOMERS, NEW YORK		
PREPARED BY: OLEY-PAVIA INC.		

2

PHOTOGRAPHS

APPENDIX B.

PHOTOGRAPH 1. CONDITION OF THE UPSTREAM SLOPE (NOTE THE LACK OF RIPRAP)

PHOTOGRAPH 2. EROSION OF UPSTREAM CREST EDGE OF DAM (VIEW: DOWNSTREAM)

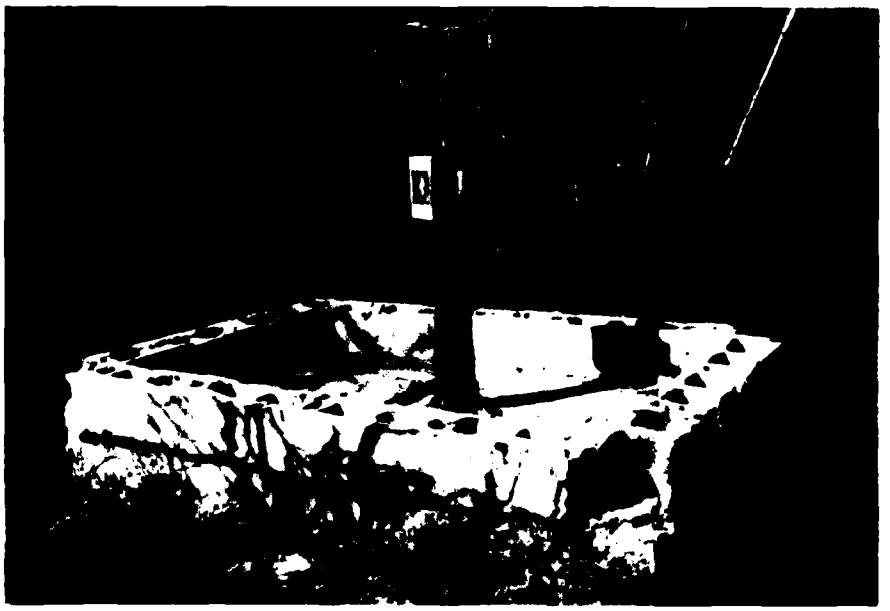
PHOTOGRAPH 3. DOWNSTREAM SLOPE OF DAM (OBSERVE THICK VEGETATION)

PHOTOGRAPH 4. CREST OF EMBANKMENT DAM (VIEW: EASTWARD FROM RIGHT ABUTMENT)

PHOTOGRAPH 5. EXPOSED STEEL SHEET PILING NEAR LEFT ABUTMENT

PHOTOGRAPH 6. CONDITION OF CONCRETE SILL STRUCTURE AND CONCRETE APRON

PHOTOGRAPH 7. DETERIORATION OF RIGHT CONCRETE TRAINING WALL



PHOTOGRAPH 8. CONCRETE PLATFORM AND CENTER-RISING SCREW FOR RESERVOIR DRAIN (OBSERVE CONDITION OF MASONRY)

PHOTOGRAPH 9. DOWNSTREAM CONCRETE SILL CHANNEL (VIEW: LOOKING UPSTREAM)

VISUAL INSPECTION CHECKLIST

APPENDIX C

VISUAL INSPECTION CHECKLIST

) Basic Data

a. General

Name of Dam LAKE LINCOLNDALE DAM

Fed. I.D. # NY 00102 DEC Dam No. 231-1030

River Basin Lower Hudson River

Location: Town Somers County Westchester

Stream Name Plum Brook

Tributary of New Croton Reservoir

Latitude (N) 41°-20.4' Longitude (W) 073°-43.7'

Type of Dam Earthfill with Steel Sheetpile Cutoff Wall

Hazard Category High

Date(s) of Inspection 17 March 1981

Weather Conditions 50°F, Sunny

Reservoir Level at Time of Inspection Approx 7.5' Below Spillway crest

b. Inspection Personnel Mr Harvey Feldman and Mr. Albert DiBernardo

c. Persons Contacted (Including Address & Phone No.)

Mr Raymond Funk (914) 258-5506

Locust Drive Lincolndale New York

d. History:

Date Constructed 1935 Date(s) Reconstructed Not Applicable

Designer Mr W. Wickstrom

Constructed By Unknown

Owner Lake Lincolndale Property Owners Association

9) Embankment

a. Characteristics

(1) Embankment Material Earthfill

(2) Cutoff Type Steel Sheetpile cutoff wall that extends into the dam foundation

(3) Impervious Core None

(4) Internal Drainage System Unknown

(5) Miscellaneous None

b. Crest

(1) Vertical Alignment Good

(2) Horizontal Alignment Good

(3) Surface Cracks None were observed; however vegetation at crest was thick

(4) Miscellaneous Substantial growth of saplings [illegible] Depression along crest at upstream edge due to pedestrian traffic.

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1:5 to 1:4

(2) Undesirable Growth or Debris, Animal Burrows Young saplings and some debris exist along upper upstream slope

(3) Sloughing, Subsidence or Depressions Erosion of upstream circle at crest edge has occurred particularly at the location of the low level outlet operating structure.

(4) Slope Protection Slope protection consists of scattered stone pieces (max. size approx 2ft in diameter)

(5) Surface Cracks or Movement at Toe Unknown since the upstream toe was below lake level. No movement, sinkholes, etc. were observed along the exposed portion of the upstream slope

d. Downstream Slope

(1) Slope (Estimate - V:H) 1 to 2 V:1H

(2) Undesirable Growth or Debris, Animal Burrows Entire slope is overgrown withtrees up to 2'ϕ, brush vines, etc, some debris

(3) Sloughing, Subsidence or Depressions The downstream slope is steeper than that shown on the construction drawings. It is uncertain whether this condition is the result of sloughing or that the embankment was originally constructed to this configuration

(4) Surface Cracks or Movement at Toe Could not be detected due to the thick cover of vegetation that existed on the downstream slope

(5) Seepage None was observed; however the lake level was low during this inspection due to dredging operation. A small patch of moss or swamp-like vegetation was observed approx. 150ft d/s of the

(6) External Drainage System (Ditches, Trenches; Blanket) None

(7) Condition Around Outlet Structure At the discharge point, the drain is overgrown with brush.

(8) Seepage Beyond Toe See (5) of Downstream Slope Section

e. Abutments - Embankment Contact

Local roadways form the contacts at both the left and right abutments.

(1) Erosion at Contact Road runoff and/or pedestrian traffic has created a gulle along d/s slope at left abutment

(2) Seepage Along Contact None was observed; however, the lake level was low at the time of this inspection During high flow conditions, the area described in (1) above sh... be investigated.

3) Drainage System

a. Description of System None

b. Condition of System Not Applicable

c. Discharge from Drainage System Not Applicable

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.)

None exist for the project.

5) Reservoir

a. Slopes Flat, as are the very crests

b. Sedimentation Silty sediments which have collected over the years are currently being dredged at the north end of the lake.

c. Unusual Conditions Which Affect Dam Gravel and stone filter beds have been constructed at roadway culvert discharge points to assist in the prevention of future sedimentation

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) Immediately d/s, there exist one home in the riverbed and a local road runs parallel to the dam. A group of houses exists about 2 miles d/s.

b. Seepage, Unusual Growth Large trees are present, fallen trees and some debris exist. For seepage observations, see Sheet 3 Item (5).

c. Evidence of Movement Beyond Toe of Dam None was observed; however vegetation was thick

d. Condition of Downstream Channel Exist was clear with some minor debris and boulders. Two 2'ø culverts exist beneath roadway approximately 150' d/s of toe. One culvert is slightly obstructed with debris

7) Spillway(s) (Including Discharge Conveyance Channel)

Concrete overflow structure consisting of a 2ft high sill (measured on d/s side) and a sloping concrete apron.

a. General Concrete apron has been either deteriorated, eroded or broken at the center portion of the crest. A 12" (approx) gate valve is located on the d/s side of the bottom center of the weir Valve has not been operational for many years. The right training

b. Condition of Service Spillway wall has cracked at the location of the sheet pile cutoff. The upstream section of the wall has rotated inward, i.e toward the spillway. Rotation at top is approximately 3 inches. The training wall concrete has been slightly eroded at its base Also at right side of sill near the training wall, concrete has broken off

c. Condition of Auxiliary Spillway None exists

d. Condition of Discharge Conveyance Channel The downstream channel is in fairly good condition; however there are several fallen trees and some debris. The channel joins the reservoir drain channel approximately 150 ft downstream of the dam.

b) Reservoir Drain/Outlet

Type: Pipe ✓ Conduit _____ Other _____

Material: Concrete ✓ Metal _____ Other _____

Size: 21" (inside diameter) Length 87± feet (measured from plan)

Invert Elevations: Entrance El 463.12 Exit El 461.3

Physical Condition (Describe): Unobservable ✓

Material: At discharge point, material appears to be in good condition

Joints: Unkown Alignment UnKnown

Structural Integrity: Exposed discharge point appears to be in good condition

Hydraulic Capability: Pipe flowed nearly full after opening (at the time of this inspection)

Means of Control: Gate ✓ Valve _____ Uncontrolled _____

Operation: Operable ✓ Inoperable _____ Other _____

Present Condition (Describe): good. Gate stem and other hardware greased, maintained & operated periodically according to Mr. Raymond Funk

9) Structural

a. Concrete Surfaces Not Applicable

b. Structural Cracking Not Applicable

c. Movement - Horizontal & Vertical Alignment (Settlement) Not Applicable

d. Junctions with Abutments or Embankments Not Applicable

e. Drains - Foundation, Joint, Face Not Applicable

f. Water Passages, Conduits, Sluices Not Applicable

g. Seepage or Leakage None observed.

h. Joints - Construction, etc. Not Applicable

i. Foundation Not Applicable

j. Abutments Not Applicable

k. Control Gates Not Applicable

l. Approach & Outlet Channels Not Applicable

m. Energy Dissipators (Plunge Pool, etc.) Not Applicable

n. Intake Structures Not Applicable

o. Stability Not Applicable

p. Miscellaneous Not Applicable

10) Appurtenant Structures (Powerhouse, Lock, Gatehouse, Other)

a. Description and Condition There are no powerhouse, lock, gatehouse, or other appurtenant structures located at the damsite.

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

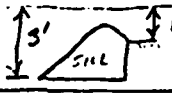
	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam *	470	27.6	275 ±
2) Design High Water (Max. Design Pool)	UnKnown	UnKnown	UnKnown
3) Auxiliary Spillway Crest	—	—	—
4) Pool Level with Flashboards	—	—	—
5) Service Spillway Crest *	467	21.6	170 ±

DISCHARGES

	Volume (cfs)
1) Average Daily	UnKnown
2) Spillway @ Maximum High Water (Top of Dam)	430 cfs
3) Spillway @ Design High Water	UnKnown
4) Spillway @ Auxiliary Spillway Crest Elevation	Not Applicate
5) Low Level Outlet	52 cfs
6) Total (of all facilities) @ Maximum High Water (Top of Dam)	482 cfs
7) Maximum Know- Flood	UnKnown
8) At Time of Inspection	None

* Data obtained from Croton Falls U.S.G.S. Quadrangle

CREST: ELEVATION: El 480



Type: Concrete Sill

Width: 2± feet Length: 25 feet

Spillover Uncontrolled

Location At left abutment

SPILLWAY:

SERVICE		AUXILIARY
El 480 (U.S.G.S.)	Elevation	Not Applicable
Concrete Sill	Type	Not Applicable
25 feet	Width	Not Applicable
	Type of Control	
Uncontrolled	Uncontrolled	Not Applicable
	Controlled:	
Not Applicable	Type (Flashboards; gate)	Not Applicable
Not Applicable	Number	Not Applicable
Not Applicable	Size/Length	Not Applicable
	Invert Material	Not Applicable
	Anticipated Length of operating service	Not Applicable
15 ft	Chute Length	Not Applicable
½ ft	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	Not Applicable

HYDROMETEROLOGICAL GAGES:

Type : None

Location: Not Applicable

Records:

Date - Not Applicable

Max. Reading - Not Applicable

FLOOD WATER CONTROL SYSTEM:

Warning System: None Exists

Method of Controlled Releases (mechanisms):

Center-rising crest type valve and sluice gate

DRAINAGE AREA: 0.54 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Community development; N.Y.C. Water Supply

Terrain - Relief: low relief, hilly terrain

Surface - Soil: Glacial Till

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

Unknown

Potential Sedimentation problem areas (natural or man-made; present or future)

Dredging operations are currently being performed to remove deposited sediments in reservoir. Gravel filter dikes have been placed at local roadway culverts to help prevent future sedimentation.

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: None

Elevation: None

Reservoir:

Length @ Maximum Pool 1400ft ~~(Miles)~~

Length of Shoreline (@ Spillway Crest) 4200 ± feet ~~(Miles)~~

TAMS

Job No. 1579-04 Sheet 1 of 9
Project LAKE LINCOLNDALE DAM Date APRIL 6, 1981
Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS By D.L.C
Ch'k. by

$L = 2.8'' = 5600' = 1.06$ miles

$L_{CA} = 0.68 = 1360 = 0.26$ miles.

Use $C_p = 0.5$

& $C_T = 2.0$

$$T_p = 2.0\{(1.06)(0.26)\}^{0.3}$$

$$= 2 \times 0.679 = 1.36 \text{ hours}$$

FROM HYDROMET # 33
ALL SEASON 200 SQMI 24 hour PMP = 22 inches

Percent of	Index rainfall
6 hr	112
12 hr	123
24 hr	133
48 hr	141

Assume Initial Loss ~ 2.0 inches

C_q Constant Loss ~ 0.1 inch/hour

% Lake Area + Impervious Area $(21.6 + 26.6)/344.35 = 0.13$

TAMS

Job No. 1519-04 Sheet 2 of 9
Project LAKE LINCOLNDALE DAM Date APRIL 81
Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS. By D L C
Ch'k. by

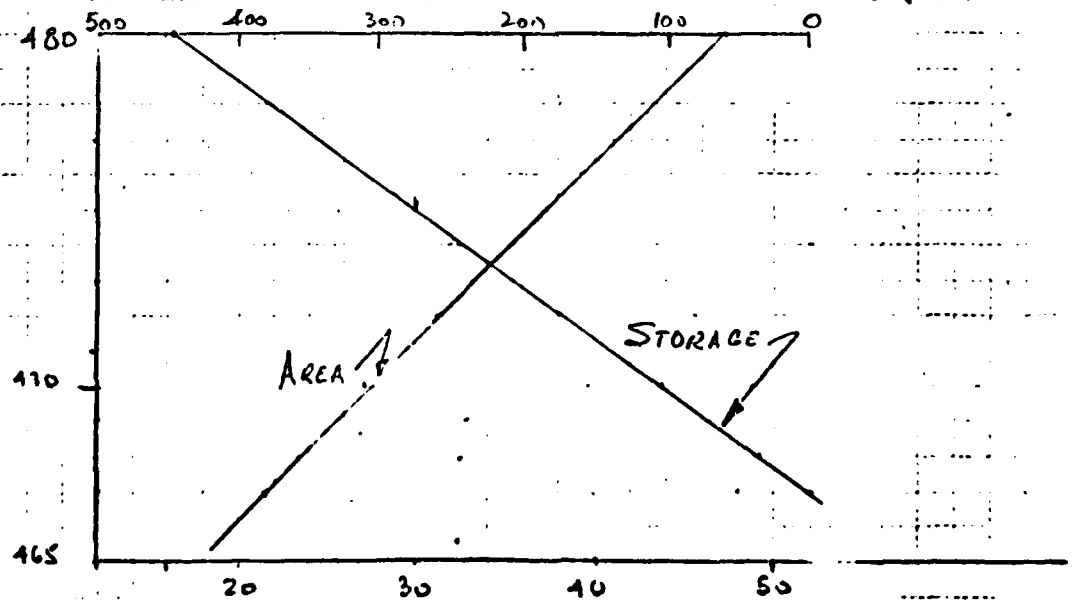
SPILLWAY DISCHARGE CAPACITY

Length - 25.0' CREST EL 467' MSL.
TOP OF DAM EL 470'.
USE C. 3.3.

EL	H.	Q	CAPACITY
467	0		170
468	1	80	205
470	3	430	275
475	8	1870	345

SURCHARGE STORAGE & RESERVOIR CAPACITY

EL	ΔH	AREA	MEAN AREA	Δ VOL.	SURCHARGE STORAGE	CAPACITY
467		21.58			0	170
	13		34.44	447.7		
480		47.29			447.7	617.7



TAMS

Job No. 1579-04 Sheet 3 of 9

Project LAKE LINCOLNDALE DAM INSPECTION Date APRIL 1981

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS By D.L.C.

Ch'k. by

Cross Section 800.' D/S of DAM.

	R Bank	Left Bank
450	0	320
440	80	280
134	160	210
480	795	205

Slope ~ 38/800 0.038

```
A1                            LAKE LINCOLNDALE DAM                 1579-C4
A2                            PHASE 1 INSPECTION
A3                           HEC-1DB PMF ANALYSIS  APR 81
B      150                   20                                               4
B1       5
J        1        4        1
J1       1      .75       .5      .25
K        0        1                                     1
K1       1 BASIN INFLOW HYDROGRAPH
M        1        1     0.54              0.54                                1
P                22      112      123      133      141
T                                                       2       .1                 .13
W     1.36       .5
X        0     -.05      1.3
K        1        2                                     1
K1       2 ROUTE THROUGH LAKE
Y                                   1        1
Y1       1                                            170       -1
Y4     447      468      470      475
Y5       0       80      430     1870
SS     170      205      275      345      448
SE     447      468      470      475      480
SS     447
SD     470     3.09      1.5      580
K        1        3                                     1
K1       3 CHANNER ROUTE D/S DAM
Y                                   1        1
Y1       1
Y6   0.035    0.035    0.035      430      450      800    0.038
Y7       0      450       80      440      160      434      195      430      205      430
Y7     210      434      280      440      320      450
K       99

  32
```

Sheet 4 of 9

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 01 APR 80

RUN DATE= 81/04/30.
TIME= 12.44.17.

LAKE LINCOLNDALE DAM 1579-04
PHASE 1 INSPECTION
HEC-1DB PMF ANALYSIS APR 81

JOB SPECIFICATION

NC	NRD	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	20	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1
RTIOS= 1.00 .75 .50 .25

****

SUB-AREA RUNOFF COMPUTATION

1 BASIN INFLOW HYDROGRAPH

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.54	0.00	.54	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.00	112.00	123.00	133.00	141.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .600

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	2.00	.10	0.00	.13

UNIT HYDROGRAPH DATA
TP= 1.36 CP= .50 NTA= 0

RECESSION DATA
STRTQ= 0.00 QRCSN= -.05 RTIOR= 1.30

UNIT HYDROGRAPH 32 END-OF-PERIOD ORDINATES, LAG= 1.36 HOURS, CP= .50 VOL= 1.00

13.	47.	89.	121.	126.	110.	91.	76.	63.	52.
44.	36.	30.	25.	21.	17.	14.	12.	10.	8.
7.	6.	5.	4.	3.	3.	2.	2.	2.	1.

1. 1.

O MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	END-OF-PERIOD FLOW MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.92 (630.)	21.63 (544.)	3.39 (86.)	22283. (630.98)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

2 ROUTE THROUGH LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	3	3	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	170.	-1

STAGE	467.00	468.00	470.00	475.00
FLOW	0.00	80.00	430.00	1870.00
CAPACITY=	170.	205.	275.	345.	448.
ELEVATION=	467.	468.	470.	475.	480.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
467.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
470.0	3.1	1.5	580.

PEAK OUTFLOW IS 1393. AT TIME 41.00 HOURS

PEAK OUTFLOW IS 1177. AT TIME 41.00 HOURS

PEAK OUTFLOW IS 582. AT TIME 42.33 HOURS

PEAK OUTFLOW IS 222. AT TIME 43.00 HOURS

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

3 CHANNER ROUTE D/S DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

BN(1)	BN(2)	BN(3)	ELMVT	ELMAX	RLNTH	SEL
.0350	.0350	.0350	430.0	450.0	800.	.03800

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 450.00 80.00 440.00 160.00 434.00 195.00 430.00 205.00 430.00
210.00 434.00 280.00 440.00 320.00 450.00

STORAGE	0.00	.30	.79	1.50	2.41	3.73	5.56	7.90	10.75	14.11
	17.94	22.05	26.41	31.01	35.85	40.94	46.27	51.84	57.66	63.73
OUTFLOW	0.00	111.69	438.95	1036.73	2011.20	3657.04	5998.26	9198.10	13397.39	18724.67
	25522.21	33794.23	43504.24	54065.59	66098.09	79425.69	94074.92	110074.03	127452.45	146240.37
STAGE	430.00	431.03	432.11	433.16	434.21	435.26	436.32	437.37	438.42	439.47
	440.53	441.58	442.63	443.68	444.74	445.79	446.84	447.89	448.95	450.00
FLOW	0.00	111.69	438.95	1036.73	2011.20	3657.04	5998.26	9198.10	13397.39	18724.67
	25522.21	33794.23	43504.24	54065.59	66098.09	79425.69	94074.92	110074.03	127452.45	146240.37

MAXIMUM STAGE IS 433.6

MAXIMUM STAGE IS 433.3

MAXIMUM STAGE IS 432.4

MAXIMUM STAGE IS 431.4

********** ********** ********** ********** **********

Sheet 7 of 9

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .75	RATIO 3 .50	RATIO 4 .25
HYDROGRAPH AT	1	.54 (1.40)	1	1406. (39.83)(	1055. 29.87)(	703. 19.91)(	352. 9.96)(
ROUTED TO	2	.54 (1.40)	1	1393. (39.46)(	1177. 33.33)(	582. 16.47)(	222. 6.28)(
ROUTED TO	3	.54 (1.40)	1	1405. (39.79)(	1137. 32.20)(	582. 16.48)(	222. 6.29)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	467.00	467.00	470.00
STORAGE	170.	170.	275.
OUTFLOW	0.	0.	430.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	470.58	.58	283.	1393.	4.67	41.00	0.00
.75	470.49	.49	282.	1177.	3.67	41.00	0.00
.50	470.15	.15	277.	582.	1.33	42.33	0.00
.25	468.91	0.00	233.	222.	0.00	43.00	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1405.	433.6	40.67
.75	1137.	433.3	41.00
.50	582.	432.4	42.33
.25	222.	431.4	43.00

Sheet 9 of 9

REFERENCES

APPENDIX E

REFERENCES

1. "Flood Hydrograph Package (HEC-1) Users Manual for Dam Safety Investigations", U.S. Army Corps of Engineers, Hydrologic Engineering Center, September 1979.

2. "Seasonal Variation of the Probable Maximum Precipitation, East of the 105th Meridian for Areas from 10 to 1,000 Square Miles, and Durations of 6, 12, 24 and 48 Hours", Hydrometeorological Report No. 33. Weather Bureau, U.S. Department of Commerce, April 1956.

3. "Recommended Guidelines for Safety Inspection of Dams", Department of the Army, Office of the Chief of Engineers, Appendix D.

4. "New Englad Upland Section", Internal Report, Civil Engineering Department, Purdue University, West Lafayette, Indiana, August 1977.

5. Geologic Map of New York, The University of the State of New York, The State Education Department, Map and Chart Series No. 5, Albany, New York, 1962.

OTHER DATA

APPENDIX F

EC DAM INSPECTION REPORT

RB	CTY	YR. AP.	DAM NO.	INS. DATE	USE	TYPE
61	66	35	001030	032472	002	2

AS BUILT INSPECTION

- [ ] Location of Spillway and outlet
- [ ] Elevations
- [ ] Size of Spillway and outlet
- [ ] Geometry of Non-overflow section

GENERAL CONDITION OF NON-OVERFLOW SECTION [1]

[2] Settlement	[2] Cracks	[1] Deflections
[2] Joints	[2] Surface of Concrete	[2] Leakage
[2] Undermining	[2] Settlement of Embankment	[2] Crest of Dam BRUSH
[2] Downstream Slope BRUSH	[2] Upstream Slope BRUSH	[2] Toe of Slope BRUSH

GENERAL CONDITION OF SPILLWAY AND OUTLET WORKS [1]

[2] Auxiliary Spillway	[2] Service or Concrete Spillway	[1] Stilling Basin
[2] Joints	[2] Surface of Concrete	[1] Spillway Toe
[2] Mechanical Equipment	[4] Plunge Pool	[1] Drain

[2] Maintenance	[B] Hazard Class
[3] Evaluation	[-14] Inspector

COMMENTS:

SPILLWAY APRON STARING TO DISINTEGRATE
BRUSH AND TREES ON NON-OVER FLOW
LEAKAGE AROUND WEST ABUTMENT
STEEPNESS OF DOWN STREAM EMBANKMENT.

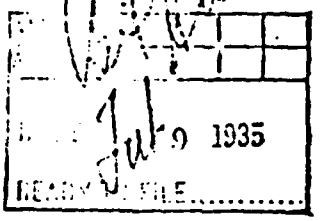
Reinsp. 8/24/79 KDH same.

FRED'K STUART GREENE
SUPERINTENDENT

CHIEF ENGINEER

DIVISION OF ENGINEERING

ALBANY, N. Y.,
February 8, 1935



Mr. J. S. Bixby,
District Engineer,
Pleasant Valley Rd.,
Poughkeepsie, N.Y.

Dear Sir:

There is being sent to you under separate cover a set of plans for a dam approved by this department. The plans were submitted by Mr. W. Wickstrom, Engineer, 17 West 56th Street, New York City.

The owner of the dam is L. B. Freudenthal, 966 First Place, Woodcliff, N. J. The dam is located in the town of Somers, Westchester County, 1½ miles northerly from Somers Center, on a branch of Plum Brook.

Very truly yours,

T. F. FARRELL,
Chief Engineer.

JPN:JT

Home Guardian Corp. Dam
Permit #L.H.W. 231-1030
Town of Somers,
Westchester County

February 14th, 1935.

T. F. Farrell, Chief Engineer,
Division of Engineering,
Albany, N.Y.

Dear Sir:

In reply to your letter dated February 8th, we beg to advise that on February 11th our representative in company with Mr. Amberg of Home Guardian Corp. and Mr. R.G. Young, Superintendent for same corporation inspected site of dam to have following characteristics:-

OWNER: - - - - - - -	-Home Guardian Co. Inc., 17 W. 56th St. N.Y.City.
Location:	Quad. 851, Sect. 4, Letter F., No. 30
Drainage Area: - - -	0.42 square mile
Maximum Depth H2O:	17 feet
Storage Capacity:-	-43,000,000 gallons
Type:	Earth Embankment with steel sheeting corewall
Length:- - - - - -	-550 feet
Spillway:	25' wide, 3' high with concrete apron
Blowoff: - - - - - -	-21" R.C.Pipe with chargate downstream
Purpose:	Real Estate Development
Foundation:- - - -	-Not visible
Workmanship:	Only fair
Designed by: - - -	-W. Wickstrom
Constructed by:	Force and materials account
Completed on: - - -	-.....

Earth embankments being constructed in haphazard manner of frozen earth in such manner as to cause considerable nesting of boulders alongside of corewall and elsewhere.

Steel sheeting previously used elsewhere.

Embankments approximately 50% completed on February 11th.

Failure of this dam would probably cause no loss of life but might damage Mahopac Branch of N.Y. & H.R. R.R. and C.H. #261.

Home Guardian Corp. Dam
Permit #L.H.W. 231-1030
Town of Somers,
Westchester County

At time of inspection the foundation was not visible due to fact that lower third of embankment height had been constructed throughout.

Embankments built of sandy clay and containing 10+% man size boulders.

Steel sheet piling all in place; length (depth) unknown.

Very truly yours,

J. S. B I X B Y

District Engineer

CAH/BHI

Copy to Mr. Huhne

Municipal Building
New York

May 29, 1935

Hon. Frederick Stuart Greene, Supt.
State Department of Public Works,
353 Broadway, Albany, N. Y.

Dear Sir:

The Home Guardian Company of New York, 17 West 56th Street, New York City, is developing 300 acres of land on the westerly side of Lovell Street in the town of Somers, Westchester County. A dam has been constructed on the westerly branch of Plum Brook about one-quarter of a mile west of Lovell Street, and approximately one-half a mile south of the Putnam County line. The dam is about 25 feet in height, and the artificial lake formed thereby will be approximately 25 acres in area, and hold over a million gallons of water.

We have had considerable difficulty in having the developers comply with our rules and regulations for the protection of the City's water supply. The overflow from the dam discharges into the westerly branch of Plum Brook, one-half a mile above the intake of the water supply for the Lincoln Agricultural School, and two and a half miles above the Plum Brook Cove of the Muscoot Reservoir.

We understand that no plans for the construction of the dam in question were submitted to or approved by the State Department of Public Works.

It is respectfully requested that you compel the company to comply with the provisions of paragraph 948, Article 17, of the Conservation Law, for submitting the plans for the dam, and that a hearing be held before approval thereof, at which the City of New York shall be granted an opportunity of being heard.

Very truly yours,

Charles O. Keutgen,
Deputy and Acting Commissioner.

FRED'K STUART GREENE
SUPERINTENDENT

DIVISION OF ENGINEERING

THOMAS F. FARRELL
CHIEF ENGINEER

ALBANY, N. Y.,
June 3, 1935

Mr. J. S. Bixby, Dist. Engr.,
Pleasant Valley Road,
Poughkeepsie, N. Y.

Dear Sir:

There is being sent you enclosed herewith a copy of a letter received from Charles G. Keutgen, Deputy and Acting Commissioner, Department of Water Supply, Gas and Electricity of the City of New York. We fail to identify the dam, described in the enclosed letter, as one for which the approval of this department has been granted.

We have written to the Home Guardian Company of New York for their explanation of the situation.

Please make an investigation of the physical conditions and report your findings to this office.

Very truly yours,

T. F. FARRELL,
Chief Engineer.

JPN:JT
Enc. 1

Home Guardian Corp. Dam
Permit #L.H.W. 231-1030
Town of Somers
Westchester County

June 4, 1935.

Mr. T. F. Farrell
Chief Engineer
Albany, New York

Dear Sir:-

In reply to your letter dated June 3, subject as above, we beg to advise that you approved plans for the dam on west branch of Plum Brook on February 7, 1935, and we reported field inspection under date of February 14, 1935.

Kindly advise if you wish us to make an additional investigations.

Comm'r Keutgen's letter leads to the suggestion that public hearings for interested parties be held before granting permits for dams to be located on water supply watersheds.

Very truly yours,

J. S. BIXBY

CAH:EMT

District Engineer

STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS

FRED'K STUART GREENE
SUPERINTENDENT

THOMAS F. FARRELL
CHIEF ENGINEER

DIVISION OF ENGINEERING

ALBANY, N. Y.,

June 6, 1935

ATTEN.
ANS
REC'D JUN 7 1935
READY TO FILE.....

Home Guardian Corp. Dam
Permit #L.H.W 231-1030
Town of Somers
Westchester Co.

Mr. J. S. Bixby,
District Engineer,
Pleasant Valley Rd.,
Poughkeepsie, N. Y.

Dear Sir:

Since writing to you on June 3, 1935, in regard to a dam being constructed by the Home Guardian Company of New York, we have learned that this dam was approved by us on February 6, 1935 for Ludwig B. Freudenthal, 966 First Place, Woodcliff, N. J., as owner. The dam is designated by us as 231-1030 Lower Hudson Watershed and one set of approved plans was sent to you on February 6, 1935.

As to your suggesting that hearings be held before granting permits for dams located on water supply watersheds, we would draw your attention to the fact that we have no authority for holding such hearings nor have we any authority to withhold a permit for a properly designed and constructed dam where the dam is built on privately owned property. If there is any objection on the part of those who have to do with public water supplies to the existence of such a dam and the purposes for which the owner sees fit to use it, the property can be appropriated for a public use.

The lawful enjoyment of such property by the rightful owner cannot be curtailed without due recompense. This phase of the situation we are wholly disinterested in.

Very truly yours,

T. F. FARRELL,
Chief Engineer.

JPN:JT

Form E-61
8-33-500 (11E-898)

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

Received Feb. 6, 1935. Dam No. 231-1030

Disposition Feb. 7, 1935 Watershed Lower Hudson

Foundation inspected

Structure inspected

Application for the Construction or Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see last page of this application) for the approval of specifications and detailed drawings, marked Plan of Proposed Dam across Branch of Plum Brook, Westchester, New York.

herewith submitted for the {construction / ~~reconstruction~~} of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about May 1st, 1935 (Date)

1. The dam will be on a branch of Plum Brook flowing into Croton Reservoir in the town of Somers, County of Westchester and 1 1/2 miles northerly from Somers Center (give exact distance and direction from a well-known bridge, dam, village main cross roads or mouth of a stream)
2. Location of dam is shown on the Carmel quadrangle of the United States Geological Survey.
3. The name of the owner is L.B.Freudenthal
4. The address of the owner is 966 First Place, Woodcliff, N.J.
5. The dam will be used for impounding lake for recreation purposes
6. Will any part of the dam be built upon or its pond flood any State lands? No
7. The watershed above the proposed dam is .59 square miles.
8. The proposed dam will create a pond area at the spillcrest elevation of 24.5 acres and will impound 6,150,000 cubic feet of water.

9. The maximum height of the posed dam above the bed of the stream is 17 feet - inches.

10. The lowest part of the natural shore of the pond is 20 feet vertically above the spillcrest, and everywhere else the shore will be at least 40 feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam --

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) yellow clay mixed with sand and few boulders

13. Facing down stream, what is the nature of material composing the right bank? yellow clay mixed with sand

14. Facing down stream, what is the nature of the material composing the left bank? yellow clay mixed with sand

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Bed and banks are hard, impervious, none water bearing, uniform and show no unusual effects of exposure to air or water

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. WASTES. The spillway of the above proposed dam will be 25 feet long in the clear; the waters will be held at the right end by a concrete wall the top of which will be 3 feet above the spillcrest, and have a top width of 1 feet; and at the left end by a concrete wall the top of which will be 3 feet above the spillcrest, and have a top width of 1 feet.

18. The spillway is designed to safely discharge 265 cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

One 20 inch pipe with gate

20. What is the maximum height of flash boards which will be used on this dam?

21. APRON. Below the proposed dam there will be an apron built of reenf. conc. 25 feet long across the stream, 16 feet wide and 1 feet thick.

22. Does this dam constitute any part of a public water supply? No

SECTION 948 OF THE CONSERVATION LAW

§ 948. **Structures for impounding water; inspection of docks; penalties.** No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, remove, repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or who hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this state a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works of plans and specifications heretofore approved by such commission or commissioner under this section.

The foregoing information and accompanying plans and specifications are correct to the best of my knowledge and belief.

Ludwig B Grundtvig, Owner.

By _____, authorized agent of owner.

Address of signer 966 First Place, Woodcliff, NJ Date February 4th, 1935

END

DATE
FILMED

12-81

DTIC